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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of : March 20, 2002
CHAPMAN : Group Art Unit: 1773
Filed: June 8, 1999 : Examiner: Ahmed, S.
Serial No.: 09/350,060 : Docket No.: W9443-02
For: INK RECEPTIVE COATINGS AND
RECORDING MEDIUM PREPARED THEREFROM

APPEAL BRIEF

Sir:

Pursuant to the Notice of Appeal filed on November 20, 2001, Applicant hereby submits this Brief and Appendix. The period for submitting the appeal has been extended by two (2) months to March 20, 2002, in view of the enclosed Request for Extension of Time and authorization therein to charge the appropriate fee to Deposit Account 07-1770.

Real Party in Interest

W. R. Grace & Co.-Conn. ("Grace") is the real party at interest in this appeal. Applicant's agreement to assign the application to Grace is confirmed an agreement executed by Applicant on July 8, 1999.

Related Appeals and Interferences

The undersigned is not aware of any other appeals or Interferences related to this appeal.

CERTIFICATE OF MAILING UNDER 37 C.F.R. §1.8

Pursuant to 37 CFR §1.8, I hereby certify that I have a reasonable basis to expect that this correspondence will be deposited with the United States Postal Service on or before the date indicated, as First Class mail, in an envelope addressed to: Director of Patents and Trademarks, Washington, D.C. 20231.

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Status of Claims

Claims 1 – 30 attached in the Appendix are the subject of this appeal. Claims 1 – 30 are pending and finally rejected for the reasons stated in a Final Rejection mailed May 22, 2001. An Advisory Action mailed on October 26, 2001, has maintained these rejections.

Status of Amendments

No amendments have been requested in this application nor have any amendments been requested after the May 22, 2001, Final Rejection.

Summary of the Invention

Applicant's invention relates to a relatively high solids ink-receptive formulation which provides coated recording media, e.g., inkjet recording paper, having optimum ink-receptive properties. It is desirable to improve a coating formulation's ink-receptive properties by incorporating porous particles at relatively high solids contents. However, it is difficult to prepare such formulations due to the fact that as the amount of porous particles increases, the more difficult it is to disperse the particles. High amounts of porous solids generally result in relatively viscous dispersions which are more difficult to coat and thereby more difficult to utilize in automated coating equipment. Applicant believes that he has discovered a composition which addresses this problem, while at the same time maintains or improves ink receptivity and printability properties of the coating.

Specifically, Applicant's invention is a coating composition comprising (a) nonionic latex polymer; (b) porous inorganic oxide having a pore volume in the range of 0.6 to 3.0 cc/g wherein the inorganic oxide further possesses a cationic charge; and (c) water soluble polymer, wherein the coating composition has a solids content of at least 20% by weight and has a Brookfield viscosity of 5000 centipose or less.

Applicant has discovered that by employing a nonionic latex binder, one is able to prepare a coating composition comprising at least 20% by weight solids of porous inorganic oxides, i.e., those having a pore volume in the above range, and especially those having a pore volume in the range of

0.9 to 2.5 cc/g. The advantages of employing this latex are shown by Applicant in his examples comparing his latex against latexes having a negative or positive charge.

Page 8, lines 13 – 20, describe that nonionic vinylacetate polymers are suitable nonionic latex polymers and that polyvinylacetate homopolymers are preferred. Page 8, lines 17 – 20, mention various references showing that the preparation of such polymers are known to those skilled in the art.

Suitable porous inorganic oxide particles having the above-mentioned pore volumes are described on page 12, line 22, through page 13, line 5. Page 13, line 6, mentions that silica gels are particularly preferred porous inorganic oxides. As mentioned above, and as described on page 14, lines 1 – 13, these inorganic oxides are cationic. The methods for preparing the same are described on page 14, lines 14 – 21. Preferred cationic inorganic oxides comprise alumina.

The water soluble polymers are described on page 10, lines 16 – page 12, line 20. It is mentioned on page 11, line 19, that a preferred water soluble polymer is polyvinylalcohol.

Applicant has also shown that when employing the above components to prepare an ink-receptive coating composition, one is able to obtain a relatively low viscous coating material that still provides for a relatively high solids content material that offers optimal printing formulations from the final dried coating. Incorporating similar porous inorganic oxide materials and at similar levels, Applicant compared his nonionic latex versus a cationic shell copolymer (Example 2) and an anionic shell copolymer (Example 3). The results in Example 2 show that the cationic copolymer-based coating suffered from color appearance and ink drytime problems. Example 3 showed that the anionic copolymer gelled and was too viscous to coat. Advantages of cationic porous inorganic oxide are indicated in Table 1 on page 24 wherein it is shown that the cationic nature of the material not only reduces viscosity, but also improves printing performance. It is submitted that the prior art relied upon, and discussed later below, do not suggest a composition which can achieve the properties shown for Applicant's composition.

Issues

(1) The Final Rejection states that claims 1 – 3, 5 – 8, 13 – 20, 23, 24 and 27 – 30, are rejected under 35 USC §103 as being unpatentable over U. S. Patent 5,660,928 to Stokes et al. (Stokes et al.) in view of U.S. Patent 3,007, 878 to Alexander et al. (Alexander et al.). Stokes et al. discloses latex binders in combination with hydrophilic silica, but is silent as to the charge of the latex described therein and, therefore, there is an issue as to whether Stokes et al. discloses a nonionic latex. The Examiner has taken the position that this silence in the disclosure is irrelevant and that all polyvinylacetates are equivalent. Stokes et al. also does not disclose or suggest the use of cationic porous particles.

Alexander et al. does disclose the manufacture of cationic silica particles. However, there is an issue as to whether Alexander et al. discloses *porous* cationic particles. There also is an issue of whether there is an express disclosure in either of these references to combine their teachings.

(2) The Final Rejection states that dependent claims 10 – 12, 21, 22, 25, and 26 are unpatentable over Stokes et al. in view of Alexander et al. and U. S. Patent 5,494,759 to Williams et al. (Williams et al.). Williams et al. discloses a cationic polymer recited in the above claims, but the issue in (1) above remains, i.e., whether combining Williams et al. with the references mentioned in (1) goes any further in suggesting Applicant's invention.

(3) The Final Rejection also states that claims 1 – 3, 5 – 10, and 13 – 30, are rejected under 35 USC §103 as being unpatentable over European Patent 586486 to Abe et al. (Abe et al.). The issue is similar to that in (1) above, specifically, whether Abe et al. discloses and suggests nonionic latex in combination with cationic porous inorganic oxide particles.

(4) The Final Rejection also states that claims 1 – 3, 8 – 16, and 20 – 29, are rejected under 35 USC §103 as being unpatentable over German Patent 19534327 to Koch et al. (Koch et al.). The issue is whether Koch et al. suggests the advantages of using formulations containing the specific combination of nonionic latex and cationic porous pigments, much less those formulations containing porous silicas having pore volumes of 0.9 cc/g and higher.

(5) Dependent Claim 4 is separately rejected under three separate combinations of references, including (a) a combination of Stokes et al. in view of Alexander and U.S. Patent 4,115,474 to Vassiliades et al. (Vassiliades et al.), (b) Abe et al. in view of Vassiliades et al., and (c) Koch et al. in view of Vassiliades et al. While Vassiliades et al. disclose microcapsules comprising a polyvinylalcohol shell encapsulating a polymeric core, the issue remains as above, i.e., whether the combination of the references above in combination with Vassiliades et al. suggest core/shell nonionic latex polymers which are suitable for making high porous solids content coating compositions.

Claim Groupings

Applicant requests that the claims be grouped as follows for consideration under this Appeal.

The first group contains claims 1 – 5, 7 – 17, and 19 – 30.

The second group of claims to be considered hereunder are claims 6 and 18. They recite preferred embodiments of the invention wherein the inorganic oxide is silica which has a pore volume in the range of 0.9 to 2.5 cc/g.

Arguments

(1) §103 Rejection Based on Stokes et al. in view of Alexander et al

The Final Rejection maintains that the above-mentioned combination of references render claims 1 – 3, 5 – 8, 13 – 20, 23, 24, and 27 – 30 unpatentable under §103. Stokes et al. disclose a coated film or non-woven substrate wherein the coating comprises latex binder, hydrophilic silica, and a water soluble viscosity modifier. Stokes et al. mentions that poly(vinylacetate) is an example of a latex binder to be used for the coating (column 3, line 22). Stokes et al., however, does not disclose whether a charged polyvinylacetate is to be used, nor does Stokes et al. disclose that the hydrophilic silica contains a cationic charge. Alexander et al., on the other hand, does disclose a positively charged colloidal silica, and, it is the Examiner's position that the combination of those references renders Applicant's invention obvious. Applicant, however, respectfully requests reconsideration.

Specifically, Applicant's latex is *nonionic*, and it is Applicant's position that the mere mention of polyvinylacetate does not expressly refer to such polymers. Indeed, polyvinylacetate can be anionic and Applicant refers to a Rohm and Haas brochure enclosed with its March 19, 2001, Office Action listing such anionic polyvinylacetates. Stokes et al. is silent as to the charge of the vinylacetate mentioned therein and, therefore, it is Applicant's position that one cannot be inferred. Moreover, the Examiner has made no showing for the proposition that all polyvinylacetates are equivalent and, therefore, failed to establish a *prima facie* case of obviousness under §103.

Furthermore, even in the event the Examiner had established a *prima facie* case of obviousness, it is submitted that Applicant has shown that a nonionic latex provides a coating formulation having properties superior to those prepared from anionic latex polymers. See the results from Example 3, Example 5, and Figures 1 – 3. Figure 1 shows that a nonionic latex-based formulation has a lower formulation viscosity on a equal solids basis compared to an anionic polymer latex-based formula. Figure 2 shows that the nonionic latex also provides better color appearance, and Figure 3 shows better drytimes for the nonionic latex-based formulation. Such advantages are neither disclosed nor suggested by Stokes et al.

As acknowledged by the Examiner, Stokes et al. also does not disclose cationic inorganic oxide particles. Alexander et al.'s disclosure is relied upon for taking that position. However, it is respectfully submitted that Alexander et al. discloses *colloidal* silica. It does not disclose or suggest porous silica. For example, Alexander et al. refers to dense spheres of silica on column 3, lines 11 and 20. Applicant has earlier submitted pages from Ralph Iler's "The Chemistry of Silica" to support this position. Indeed, Ludox[®] colloidal silica, a bulletin for which is also part of the record, has no internal surface area and those skilled in the art readily understand that this would mean that the bulletin is referring to non-porous materials. In support of that, Applicant refers to the pages from Iler stating that colloidal is generally non-porous if grown in alkaline solution and formed at elevated temperature, and further refers to U.S. Patents 2,573,743; 2,750,345; and 2,515,960. Alexander et al. mention, on column 2, lines 71 – 72, that these references describe preparing

colloidal silica, and it is submitted that the general indication from those patents is that the colloidal silica prepared therein is prepared at alkaline conditions. Accordingly, the evidence submitted by Applicant is that the processes which Alexander et al. refer to produce non-porous colloidal silica. The Examiner, on the other hand, maintains the particles are porous. It is respectfully submitted that the Examiner has provided no support other than speculation as to the porosity of silica described by Alexander et al.

It is also submitted that there is no suggestion by either Stokes et al. or Alexander et al. to employ cationic particles in Stokes et al.'s formula. Stokes et al. is silent in column 3 as to whether hydrophilic silica has a positive charge. Alexander et al. does disclose positively charged colloidal silica, but discloses on column 7 that a primary use for the silica is as a ceramic binder. Stokes et al. does mention on column 7, lines 49 – 51, that the sol of charged silica can be used as a "coating agent," but it directs its suggestion to coating "negative" surfaces such as glass, thereby suggesting that the sol per se be used as protective coating. Needless to say, there is no suggestion by Alexander et al. to employ its silica particles in a latex formula so as to improve ink receptivity or reduce viscosity of the same. See Table 1 of Applicant's specification.

In view of the above, it respectfully submitted that the Examiner has failed to establish a *prima facie* case of obviousness of the subject matter recited in the above claims based on the above-mentioned combination of references. Furthermore, in view of Alexander et al. suggesting the employment of cationic non-porous colloidal silica particles, it is respectfully submitted that even if one was to combine the teaching of the above-mentioned references, one would not even arrive at Applicant's invention. Accordingly, Applicant respectfully requests reversal of the above-mentioned rejection.

(2) *§103 Rejection Based on Stokes et al. and Alexander et al. further in view of Williams et al.*

Dependent claims 10 – 12, 21, 22, 25 and 26 recite embodiments of Applicant's invention which further comprise a water soluble cationic polymer

(d) in addition to components (a), (b), and (c) mentioned above. However, it is respectfully submitted that in light of the deficiencies noted above with respect to Stokes et al. and Alexander et al., even if one was to combine the teachings of Williams, one would not arrive at a high solids formulation comprising highly porous inorganic oxide particles in nonionic latex binder. Accordingly, reversal of this rejection is also requested.

(3) *§103 Rejection Over Abe et al.*

Abe et al. discloses an ink jet recording sheet which has been coated with a composition containing a specific cationic-modified silica, i.e., cationic non-spherical colloidal silica. The Examiner has further noted that the cationic modified silica is coated with a metal oxide such as aluminum oxide. It is respectfully submitted, however, that the silica disclosed by Abe et al. is similar to the colloidal materials disclosed by Alexander et al. Specifically, Abe et al. describes on the very first page of the section titled "Description of the Invention" that the cationic modified silica is "colloidal." It is respectfully submitted that the evidence mentioned above with respect to Alexander et al. support the proposition that colloidal silicas are generally non-porous and it is respectfully submitted the Examiner has not submitted any reasoning or evidence to suggest the contrary. The Examiner states in his October 26, 2001, Advisory Action that he disagrees with Applicant's comments with respect to Abe, but does so by again referring back to Alexander. For example, the Examiner merely states that the process used to make suitable colloidal silica for Abe are those disclosed by Alexander. As mentioned above, Alexander et al. discloses making non-porous inorganic oxide colloidal particles. It is also not seen where Abe et al. disclose a non-ionic latex. Accordingly, Applicant respectfully requests reversal of this rejection.

(4) *§103 Rejection over Koch et al.*

Koch et al. discloses a paper coating composition containing cationic pigments in combination with various binders, including cationic binders and/or "noniogenic" binders. Koch et al. also discloses that high solids coatings in the range of 20 – 70% by weight can be obtained. However, it is

respectfully submitted that Koch et al. do not direct one to the specific combination of nonionic polymers with highly porous pigments to obtain the advantages noted by Applicants. Furthermore, it is respectfully submitted that Applicant's Example 2 indicates that there is an advantage of nonionic binders over other types of binders, including the cationic binders suggested by Koch et al. Koch et al. do not note or suggest such advantages and, therefore, it is respectfully submitted that Applicant has overcome any *prima facie* case of obviousness presented by the Koch et al. reference.

Applicant also respectfully submits that Koch et al. does not disclose nor suggest preferred embodiments of Applicant's invention in which the inorganic oxide porous materials have a pore volume in the range of 0.9 cc/g – 2.5 cc/g, as recited in claims 6 and 18. Koch et al.'s cationically modified pigments are illustrated by reference to calcium carbonates and fumed silicas. These pigments are specifically defined as having limited porosity of no more than 0.9 ml/g, and it is envisioned that the coating's overall ink capacity would be limited when using those pigments. It is submitted that Koch et al. at best disclose the possibility of preparing high solids porous materials having a pore volume of at most 0.9 cc/g. Indeed, it is submitted that it would not be apparent from Koch et al. that one could obtain high solid levels of materials containing pore volumes greater than that. It is further submitted that any high solids coatings mentioned therein were likely from relatively low porous materials that do not present viscosity issues such as those that can be presented by using the porous pigments which Applicant employs. In summary, it is respectfully submitted that Koch et al.'s teachings is directed towards relatively low porous materials and, therefore, Koch et al. would have not recognized advantages of replacing cationic latex with nonionic latex binders when preparing formulations of highly porous, cationically charged materials. Accordingly, withdrawal and reversal of this rejection is requested.

(5) *Claim 4 Rejections Under §103*

The combinations of (a) Stokes et al. and Alexander et al., (b) Abe et al., and (c) Koch et al. have been further combined with the Vassiliades et al. reference. Vassiliades et al. discloses microcapsules comprising a polymeric

shell of polyvinyl alcohol which in turn encapsulates a polymeric core. The Examiner refers to column 2, lines 11 – 20, 67 – 68, and column 3, lines 22 – 25, in support of this position. However, it is respectfully submitted that Vassiliades et al. goes no further in suggesting the above-mentioned combination of porous inorganic oxide particles in combination with a nonionic latex binder to produce a superior ink-receptive coating composition. At best, Vassiliades et al. discloses materials which could be combined with the materials described by the above-mentioned references (a) – (c). However, as noted above, those references neither disclose nor suggest all of the components of Applicant's coating composition. In summary, Vassiliades et al. go no further in establishing a *prima facie* case of obviousness under §103. Withdrawal and reversal of these three rejections is therefore requested.

In view of the above, Applicant earnestly solicits a notice indicating that the above rejections have been reversed and that claims 1 – 30 are allowable over the prior art cited by the Examiner.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Charles A. Cross". The signature is fluid and cursive, with the first name "Charles" being more prominent and the last name "Cross" following in a similar style.

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1. A coating composition comprising
 - (a) non-ionic latex polymer;
 - (b) porous inorganic oxide having a pore volume in the range of 0.6 to 3.0 cc/g wherein the inorganic oxide further possesses a cationic charge; and
 - (c) water soluble polymerwherein the coating composition has a solids content of at least 20% by weight and has a Brookfield viscosity of 5000 centipose or less.
2. A composition of claim 1 wherein (a) is polyvinyl acetate.
3. A composition of claim 2 wherein (a) is polyvinyl acetate homopolymer.
4. A composition of claim 2 wherein the polyvinyl acetate has a core and shell, further wherein the shell comprises polyvinyl alcohol.
5. A composition of claim 1 wherein the porous inorganic oxide is silica.
6. A composition of claim 5 wherein the silica has a pore volume in the range of 0.9 to 2.5 cc/g.
7. A composition of claim 5 wherein the silica has a coating comprising alumina.
8. A composition of claim 1 wherein the water soluble polymer is a member of the group consisting of polyvinyl alcohol, hydroxyethyl cellulose, methyl cellulose, dextrin, pluran, gelatin, starch, gum arabic, dextran, polyethylene glycol, polyvinyl pyrrolidone, polyacrylamide, polypropylene glycol and mixtures thereof.

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9. A composition of claim 4 wherein the water soluble polymer is polyvinyl alcohol.

10. A composition of claim 1 further comprising (d) a water soluble cationic polymer.

11. A composition of claim 10 wherein (d) comprises quaternary ammonium.

12. A composition of claim 11 wherein (d) is a polydiallyl dimethyl ammonium chloride.

13. A composition of claim 1 wherein the solids content of the composition is in the range of about 25 to about 40% by weight.

14. A recording medium comprising a substrate and coating thereon wherein the coating comprises

- (a) non-ionic latex polymer;
- (b) porous inorganic oxide having a pore volume in the range of 0.6 to 3.0 cc/g and possessing a cationic charge; and
- (c) water soluble polymer.

15. A recording medium of claim 14 wherein (a) is polyvinyl acetate.

16. A recording medium of claim 15 wherein (a) is polyvinyl acetate homopolymer.

17. A recording medium of claim 14 wherein the porous inorganic oxide is silica.

18. A recording medium of claim 14 wherein the silica has a pore volume in the range of 0.9 to 2.5 cc/g.

19. A recording medium of claim 17 wherein the silica has a coating of alumina.

20. A recording medium of claim 14 wherein the water soluble polymer is a member of the group consisting of polyvinyl alcohol, hydroxyethyl cellulose, methyl cellulose, dextrin, pluran, gelatin, starch, gum arabic, dextran, polyethylene glycol, polyvinyl pyrrolidone, polyacrylamide, polypropylene glycol and mixtures thereof.

21. A recording medium of claim 14 further comprising (d) a water soluble cationic polymer.

22. A recording medium of claim 14 wherein the coating is present on the substrate in the range of 5 to 10 g/m².

23. A high solids coating composition comprising
(a) polyvinyl alcohol;
(b) nonionic latex; and
(c) surface-modified inorganic oxide
wherein the coating has a total volume fraction in the range of 0.25 to 0.50.

24. A coating according to claim 23 wherein the solids content is greater than 23% by weight.

25. A coating composition according to claim 23 further comprising dye mordant.

26. A coating composition according to claim 25 wherein the dye mordant is cationic polymer.

27. A coating composition according to claim 23 wherein the weight ratio of (b) to (a) is in the range of 0.2 to 5.0.

28. A coating composition according to claim 23 wherein the coating composition has a Brookfield viscosity of less than 2000 centipose.

29. A coating composition according to claim 23 wherein (b) comprises polyvinylacetate.

30. A coating composition according to claim 23 wherein the inorganic oxide is silica which has been modified by alumina.